NON-PUBLIC?: N
ACCESSION #: 9311010210
LICENSEE EVENT REPORT (LER)

FACILITY NAME: James A. FitzPatrick Nuclear Power Plant PAGE: 1 OF 6

DOCKET NUMBER: 05000333

TITLE: Reactor High Pressure Scram Due To Turbine Bypass Valve
Partial Closure
EVENT DATE: 09/24/93 LER #: 93-020-00 REPORT DATE: 10/25/93

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: N POWER LEVEL: 017

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: Mr. Donald Simpson TELEPHONE: (315) 349-6361
Senior Licensing Engineer

COMPONENT FAILURE DESCRIPTION:
CAUSE: SYSTEM: COMPONENT: MANUFACTURER:
REPORTABLE NPRDS:

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT:

On September 24, 1993, at 0709 hours, an automatic reactor scram took place when the Main Turbine Bypass Valves partially closed during the conduct of troubleshooting. Due to the potential risk of initiating a turbine trip, reactor power had been reduced, and the Main Turbine had been taken out of service to support troubleshooting an electrical ground in the Turbine Electrohydraulic Control System (EHC). The plant was at 17.5 percent power in the RUN mode with reactor pressure being controlled automatically by the Main Turbine Bypass Valves. While lifting individual leads in the Main Turbine Alarm and Trip circuit, a partial closure of the Turbine Bypass Valves occurred. The Bypass Valve partial closure caused reactor pressure to increase and an automatic scram on high reactor pressure. The event was caused by personnel error. Personnel performing the troubleshooting did not adequately verify plant response. The use of electrical drawings that did not adequately support

troubleshooting contributed to the event cause. The electrical drawings will be upgraded.

END OF ABSTRACT

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DESCRIPTION

The plant was operating at 100 percent power in the RUN mode on September 21, 1993 when a ground was identified on the 125V DC power system EJ!. The operating crew implemented a ground isolation abnormal operating procedure to locate the ground. A steam leak in the Turbine Building in the vicinity of the high pressure turbine was suspected as a potential cause of the ground. On September 22, 1993 at 0705 hours, the ground had been located somewhere within the Electrohydraulic Control System (EHC) Turbine Alarm and Trip Circuit JJ!. Additional troubleshooting was required to identify the actual location of the ground.

A troubleshooting team headed by an Instrument and Control Supervisor was assembled. The team included a senior maintenance engineer, a technical services engineer, an electrical maintenance supervisor and two Instrument and Control Technicians. Upon reviewing the circuit diagrams, the team determined that further troubleshooting could not be performed with the unit on line due to the potential for initiating a turbine trip. The team recommended that the unit be taken off line to further isolate and repair the ground. The team erroneously concluded that troubleshooting the ground would have no adverse effect on turbine bypass valve JI! operation because these valves were believed to be independently controlled by a separate 24V DC power supply. Reactor power was reduced and the Main Turbine TA! taken off line at 0335 hours on September 24, 1993. It was observed that the magnitude of the ground reduced with the power reduction.

Reactor power was 17.5 percent in the RUN mode with the main turbine bypass valves JI! being used to automatically maintain reactor pressure at 935 psig when troubleshooting resumed at approximately 0500 hours on September 24, 1993. Troubleshooting included both circuit analysis and visual inspection for potential ground locations.

The first step in troubleshooting removed 125V DC power from the EHC panel to the alarm and trip bus. Completion of this step confirmed that the ground was located on the alarm and trip portion of the 125V DC power system. Power was restored to the alarm and trip bus within

approximately 35 seconds. The brief interruption of power had no apparent effect on turbine bypass valve control as confirmed by the operating crew. The troubleshooting continued, lifting leads one at a time to isolate parallel paths within the circuit.

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DESCRIPTION (continued)

Concurrently with this activity, electrical maintenance personnel visually inspected EHC switches and components which may have been wetted by condensation from a pre-existent steam leak in the area. Although the steam leak had stopped with the power reduction, several components in the vicinity of the Turbine Bypass Valves and Turbine Stop Valves appeared to have been previously wetted and were potential sources of the ground. One limit switch was found with water inside upon removal of the switch cover plate. This information was fed back t
the team leader by
the maintenance electricians.

At 0657 hours, an EHC panel interior wire was lifted which significantly decreased the ground. Team members were planning the next step in troubleshooting at the EHC panel in the Relay Room when an automatic reactor scram on high reactor pressure occurred at 0709 hours. Concurrently with the scram, two Control Room operators observed the closure of one turbine bypass valve JI!.

With the exception of turbine bypass valve control, all plant systems responded as designed. Operators verified that all control rods AA! fully inserted and completed other actions required by Abnormal Operating Procedures (AOP) 1, Reactor Scram. Reactor water level experienced a minor transient with the lowest level approximately 16 inches below normal and the highest level approximately 20 inches above normal. The partial closure of the turbine bypass valves resulted in a gradual, approximately three minute, increasing reactor pressure transient which initiated an automatic reactor scram. Reactor pressure increased from 935 psig to 1030 psig during the transient. Technical Specifications require that the high pressure reactor scram be set less than or equal to 1045 psig. No other Engineered Safety Feature system actuations or isolations occurred. Reactor pressure decreased immediately following the scram because one turbine bypass valve remained open for several seconds. Reactor pressure was subsequently controlled manually by operators adjusting steam loads. The unit was maintained hot through the completion of troubleshooting on September 25, 1993.

On September 26, 1993 at 0103 hours, the reactor was started up. The unit was connected to the grid at 1930 hours. 100 percent power was reached on September 29, 1993 at 1355 hours.

EVENT CAUSE

The automatic reactor scram was initiated by increasing reactor pressure. The pressure increase was caused by partial closure of the Turbine Bypass Valves. The Turbine Bypass Valve closure was initiated when an EHC panel interior electrical lead was lifted.

This event was caused by poor work practices. The troubleshooting team did not adequately review available electrical wiring diagrams to evaluate response before the action was taken. The failure to adequately self-check resulted in part from the fact that there had been no effect on Turbine Bypass Valve control when power was removed earlier in the troubleshooting sequence. The JAF turbine engineer successfully reproduced the bypass valve control sequence of events while troubleshooting with the plant shutdown which indicates the event was caused by lifting of an internal EHC panel lead and that the presence of a circuit ground was not significant.

Contributing to the cause of this event was the lack of point to point wiring diagrams for the circuit being analyzed. The available drawings did not adequately support the troubleshooting effort in that the physical points of termination in the EHC panel for circuit paths were not clearly identified. All troubleshooting was performed in accordance with an approved troubleshooting procedure.

Condensed steam from an existing steam leak which wetted an EHC switch on a main turbine stop valve IT! was the probable cause of the circuit ground. Because the ground essentially went away following the power reduction, this could not be proven. The leak was assessed for potential equipment degradation in the area. Based upon this assessment, the repair was not expedited. Had the steam leak been repaired or the condensation collected in a more timely manner, the ground may have been prevented. In the course of troubleshooting, a second minor circuit ground was identified and isolated to a cable in the switchyard. This second ground had no effect on this event.

EVENT ANALYSIS

The event requires a report under 10CFR50.73 (a) (2) (iv) due to the

automatic actuation of the Reactor Protection System when reactor pressure increased to the scram setpoint.

EVENT ANALYSIS (continued)

The increase in reactor pressure was gradual, from 935 psig to 965 psig for the first 165 seconds of the transient. The bypass valves then ramped further closed and reactor pressure increased rapidly from 965 psig to 1030 psig in 24 seconds at which point the reactor scrammed. The gradual change in pressure would not have been perceptible to the Control Room operator performing routine monitoring. The rapid increase in pressure just prior to the scram would not have provided time for operator analysis and intervention even if it had been seen.

The post transient review determined that the reactor high pressure alarm did not annunciate prior to the scram initiation, therefore, there was no direct operator indication of a problem until the scram. Similarly, turbine bypass valve position indication remained intermediate, both red and green, until seconds before the scram and, therefore, was not observed by Control Room operators as an event precursor.

The event was not safety significant. The highest reactor pressure reached during the transient resulting from the Turbine Bypass Valve closure was 1030 psig which was within normal operating pressure limits. Because reactor power had been reduced prior to the event and the pressure increase was gradual, there was no significant reactor power transient and reactor water level remained near the normal level.

CORRECTIVE ACTIONS

1. Plant operators verified automatic actions were as expected, completed the actions required by AOP-1, Reactor Scram, and took manual control of reactor pressure by adjustment of steam loads.

2. Bus grounds were isolated and corrected.

3. The General Manager, maintenance issued a memorandum stating that no troubleshooting within the EHC panel would be performed without his permission until the root cause of the trip was determined and corrective actions identified. (complete)

4. An improved process for assessing the impact of steam and water leaks on plant equipment and ensuring timely repair of identified leaks will be implemented by December 15, 1993.

CORRECTIVE ACTIONS (continued)

5. The setpoint of the reactor high pressure alarm will be evaluated to determine if modification of the setpoint may make the alarm more useful as a precursor to increasing pressure events. This evaluation will be completed by December 31, 1993.

6. Evaluate a program to compare the EHC alarm and trip bus electrical drawings to the as-built configuration. The evaluation and decision will be completed by March 1994.

ADDITIONAL INFORMATION

Failed Components: None

PREVIOUS SIMILAR EVENTS

In June 1978, FitzPatrick experienced a unit trip from rated power while troubleshooting a ground in the Turbine Electrohydraulic Control System. Based upon that occurrence, the unit was taken off-line prior to troubleshooting in this event.

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Authority Harry P. Salmon, Jr.
Resident Manager

October 25, 1993
JAFP-93-0565

United States Nuclear Regulatory Commission
Document Control Desk
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SUBJECT: DOCKET NO. 50-333

LICENSEE EVENT REPORT: LER-93-020:

Reactor High Pressure Scram Due to Turbine Bypass Valve Partial Closure

Dear Sir:

This report is submitted in accordance with 10CFR50.73 (a) (2) (iv).

Questions concerning this report may be addressed to Mr. Donald Simpson at (315) 349-6361.

Very truly yours,

HARRY P. SALMON, JR

HPS: DFS: mam

Enclosure

cc: USNRC, Region I
USNRC Resident Inspector
INPO Records Center

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